

1 **CLAIM AMENDMENTS**

2 **Listing of Claims:**

3 **What is claimed, is**

4
5 1. (original) A wartermark signal generating apparatus for generating wartermark signals to be
6 embedded as a digital watermark in real-time contents, the wartermark signal generating
7 apparatus comprising:

8 input means for inputting the real-time contents;

9 an input buffer for storing the real-time contents;

10 generation means for generating, from the real-time contents, wartermark signals to be
11 outputted corresponding to predicted intensities of the real-time contents; and

12 an output buffer for storing the generated wartermark signals to be outputted,

13 wherein the generation means includes:

14 prediction means for predicting intensities of the wartermark signals from prediction of
15 perceptual stimulation values of the real-time contents after a predetermined lapse of time;

16 control means for controlling embedding by use of a message to be embedded as a digital
17 watermark in the real-time contents; and

18 means for generating the wartermark signals to be outputted by use of outputs from the
19 prediction means and outputs from the control means.

20 2. (original) The wartermark signal generating apparatus according to claim 1,

21 wherein the perceptual stimulation values represent amplitude of sound or luminance, and

22
23 the prediction means generates a predicted inaudible amount or a predicted invisible
24 amount of wartermark signals corresponding to intensities of the real-time contents after the
25 predetermined lapse of time by use of data stored in the input buffer.

1 3. (currently amended) The watermark signal generating apparatus according to claim 1
2 ~~any one of claims 1 and 2~~, wherein the control means includes means for generating a value to be
3 embedded, which is a binary based on a positive and a negative, by use of a secret key, the
4 message and a pseudo-random number.

5 4. (currently amended) The watermark signal generating apparatus according to claim 1
6 ~~any one of claims 1 to 3~~, further comprising output controlling means for controlling outputs
7 from the output buffer by comparing the generated watermark signals with the real-time
8 contents after a time needed to embed the generated watermark signals has passed.

9 5. (currently amended) The watermark signal generating apparatus according to claim 1
10 ~~any one of claims 1 to 4~~,
11 wherein the input means includes means for dividing, and inputting, the real-time
12 contents, and
13 the generation means generates watermark signals by use of the divided real-time
14 contents.

15 6. (original) A watermark signal generating method for generating watermark signals to be
16 embedded as a digital watermark in real-time contents, the method comprising the steps of:
17 inputting the real-time contents;
18 storing the real-time contents;
19 generating, from the real-time contents, watermark signals to be outputted corresponding
20 to predicted intensities of the real-time contents; and
21 storing the generated watermark signals to be outputted,
22 wherein the generation step includes the steps of:
23 predicting intensities of the watermark signals from prediction of perceptual stimulation
24 values of the real-time contents after a predetermined lapse of time;
25 controlling embedding by use of a message to be embedded as a digital watermark in the
26 real-time contents; and

1 generating the wartermark signals to be outputted by use of outputs from the prediction
2 step and outputs from the control step.

3 7. (original) The wartermark signal generating method according to claim 6,
4 wherein the perceptual stimulation values represent sound or luminance, and
5 the prediction step includes a step of generating a predicted inaudible amount or a
6 predicted invisible amount of wartermark signals corresponding to intensities of the real-time
7 contents after the predetermined lapse of time by use of data stored in the step of storing the
8 real-time contents.

9 8. (currently amended) The wartermark signal generating method according to claim 6 ~~any one of~~
10 ~~claims 6 and 7~~,
11 wherein the control step includes a step of generating a value to be embedded, which is a
12 binary based on a positive and a negative, by use of a secret key, the message and a
13 pseudo-random number.

14 9. (currently amended) The wartermark signal generating method according to claim 6 ~~any one of~~
15 ~~claims 6 to 8~~, further comprising a step of controlling outputs from the step of storing the
16 generated wartermark signals to be outputted, by comparing the generated wartermark signals
17 with the real-time contents after a time needed to embed the generated wartermark signals has
18 passed.

19 10. (currently amended) The wartermark signal generating method according to claim 6 ~~any one~~
20 ~~of claims 6 to 9~~,
21 wherein the input step includes a step of dividing the real-time contents, and
22 the generation step includes a step of generating the wartermark signals by use of the
23 divided real-time contents.

24 11. (original) A program for causing a wartermark signal generating method to be executed, the
25 program being computer-executable one for causing a computer to execute the method for

1 generating wartermark signals to be embedded as a digital watermark in real-time contents, the
2 program causing the computer to execute the steps of:

3 storing the real-time contents which have been inputted;
4 generating, from the real-time contents, wartermark signals to be outputted corresponding
5 to predicted intensities of the real-time contents; and
6 storing the generated wartermark signals to be outputted,
7 wherein the generation step includes the steps of:
8 predicting intensities of the wartermark signals from prediction of perceptual stimulation
9 values of the real-time contents after a predetermined lapse of time;
10 controlling embedding by use of a message to be embedded as a digital watermark in the
11 real-time contents; and
12 generating the wartermark signals to be outputted, by use of outputs from the prediction
13 step and outputs from the control step.

14 12. (original) The program according to claim 11,
15 wherein the perceptual stimulation values represent sound or luminance, and
16 the prediction step includes a step of generating a predicted inaudible amount or a
17 predicted invisible amount of wartermark signals corresponding to intensities of the real-time
18 contents after the predetermined lapse of time by use of data stored in the step of storing the
19 real-time contents which have been inputted.

20 13. (currently amended) The program according to claim 11 ~~any one of claims 11 and 12~~,
21 wherein the real-time contents which have been divided and inputted are used in the
22 generation step, and
23 the control step includes a step of generating a value to be embedded, which is a binary
24 based on a positive and a negative, by use of a secret key, the message and a pseudo-random
25 number.

26 14. (currently amended) The program according to claim 11 ~~any one of claims 11 to 13~~, further
27 comprising a step for controlling outputs from the step of storing the generated wartermark

1 signals to be outputted, by comparing the generated watermark signals with the real-time
2 contents after a time needed to embed the generated watermark signals has passed.

3 15. (original) A computer-readable storage medium, in which a computer-executable program for
4 causing a computer to execute a method for generating watermark signals to be embedded as a
5 digital watermark in real-time contents is stored,

6 wherein the program causes the computer to execute the steps of:

7 storing the inputted real-time contents;

8 generating, from the real-time contents, watermark signals to be outputted corresponding
9 to predicted intensities of the real-time contents; and

10 storing the generated watermark signals to be outputted,

11 wherein the generation step includes the steps of:

12 predicting intensities of the watermark signals from prediction of perceptual stimulation
13 values of the real-time contents after a predetermined lapse of time;

14 controlling embedding by use of a message to be embedded as a digital watermark in the
15 real-time contents; and

16 generating the watermark signals to be outputted, by use of outputs from the prediction
17 step and outputs from the control step.

18 16. (original) The storage medium according to claim 15,

19 wherein the perceptual stimulation values represent sound or luminance, and

20 the prediction step includes a step of generating a predicted inaudible amount or a
21 predicted invisible amount of watermark signals corresponding to intensities of the real-time
22 contents after the predetermined lapse of time, by use of data stored in the step of storing the
23 real-time contents.

24 17. (currently amended) The storage medium according to claim 15 ~~any one of claims 15~~
25 ~~and 16~~,

26 wherein the real-time contents which have been divided and inputted are used in the
27 generation step, and

1 the control step includes a step of generating a value to be embedded, which is a binary
2 based on a positive and a negative, by use of a secret key, the message and a pseudo-random
3 number.

4 18. (currently amended) The storage medium according to claim 15 ~~any one of claims 15 to~~
5 ~~17~~, further comprising a step for controlling outputs from the step of storing the generated
6 watermark signals to be outputted, by comparing the generated watermark signals with the
7 real-time contents after a time needed to embed the generated watermark signals has passed.

8 19. (original) A digital watermark embedding apparatus for embedding a digital watermark in
9 real-time contents, the apparatus comprising:

10 input means for inputting the real-time contents;
11 an input buffer for storing the real-time contents;
12 generation means for generating, from the real-time contents, watermark signals to be
13 outputted corresponding to predicted intensities of the real-time contents;
14 an output buffer for storing the generated watermark signals to be outputted; and
15 embedding means for receiving the generated watermark signals, and for embedding the
16 generated watermark signals in the real-time contents,
17 wherein the generation means includes:
18 prediction means for predicting intensities of the watermark signals from prediction of
19 perceptual stimulation values of the real-time contents after a predetermined lapse of time;
20 control means for controlling embedding by use of a message to be embedded as a digital
21 watermark in the real-time contents; and
22 means for generating the watermark signals to be outputted, by use of outputs from the
23 prediction means and outputs from the control means.

24 20. (original) The digital watermark embedding apparatus according to claim 19,
25 wherein the perceptual stimulation values represent sound or luminance, and

1 the prediction means generates a predicted inaudible amount or a predicted invisible
2 amount of watermark signals corresponding to intensities of the real-time contents after the
3 predetermined lapse of time by use of data stored in the input buffer.

4 21. (currently amended) The digital watermark embedding apparatus according to claim 19
5 ~~any one of claims 19 and 20~~, wherein the control means includes means for generating a value to
6 be embedded, which is a binary based on a positive and a negative, by use of a secret key, the
7 message and a pseudo-random number.

8 22. (currently amended) The digital watermark embedding apparatus according to claim 19
9 ~~any one of claims 19 to 21~~, further comprising output controlling means for controlling outputs
10 from the output buffer by comparing the generated watermark signals with the real-time
11 contents after a time needed to embed the generated watermark signals has passed.

12 23. (currently amended) The digital watermark embedding apparatus according to claim 19
13 ~~any one of claims 19 to 22~~, wherein the input means includes means for dividing and inputting
14 the real-time contents, and
15 the generation means generates watermark signals by use of the divided real-time
16 contents.

17 24. (currently amended) The digital watermark embedding apparatus according to claim 19 ~~any~~
18 ~~one of claims 19 to 23~~, wherein the real-time contents are music to be played live.

19 25. (currently amended) The digital watermark embedding apparatus according to ~~any one of~~
20 ~~claims 19 to 24~~, wherein the real-time contents are broadcast contents to be broadcast live.

21 26. (currently amended) The digital watermark embedding apparatus according to claim 19
22 ~~any one of claims 19 to 25~~, wherein the digital watermark embedding apparatus is included in an
23 external device of a digital television apparatus or in the digital television apparatus.

1 27. (original) A digital television apparatus, comprising:

2 means for receiving a digital broadcast, for decoding the digital broadcast, and for
3 generate the real-time contents ;

4 display means for displaying the generated real-time contents; and

5 a digital watermark embedding apparatus for embedding a digital watermark in the
6 decoded real-time contents,

7 wherein the digital watermark embedding apparatus includes:

8 input means for inputting the real-time contents;

9 an input buffer for storing the real-time contents;

10 generation means for generating, from the real-time contents, watermark signals to be
11 outputted, corresponding to predicted intensities of the real-time contents;

12 an output buffer for storing the generated watermark signals to be outputted; and

13 embedding means for receiving the generated watermark signals to be outputted, and for
14 embedding the generated watermark signals to be outputted in the real-time contents,

15 wherein the generation means includes:

16 prediction means for predicting intensities of the watermark signals from prediction of
17 perceptual stimulation values of the real-time contents after a predetermined lapse of time;

18 control means for controlling the embedding by use of a message to be embedded as a
19 digital watermark in the real-time contents; and

20 means for generating the watermark signals to be outputted, by use of outputs from the
21 prediction means and outputs from the control means.

22 28. (original) The digital television apparatus according to claim 27, wherein the digital
23 watermark embedding apparatus is included in an external device of the digital television
24 apparatus or in the digital television apparatus.

25 29. (currently amended) The digital television apparatus according to claim 27 ~~any one of~~
26 ~~claims 27 and 28,~~

27 wherein the input means includes division means, and

28 the control means controls the embedding by use of the message and a secret key.

1 30. (new) A computer program product comprising a computer usable medium having computer
2 readable program code means embodied therein for causing wartermark signal generation, the
3 computer readable program code means in said computer program product comprising computer
4 readable program code means for causing a computer to effect the functions of claim 1.

5 31. (new) A computer program product comprising a computer usable medium having computer
6 readable program code means embodied therein for causing wartermark signal generation, the
7 computer readable program code means in said computer program product comprising computer
8 readable program code means for causing a computer to effect the functions of claim 19.

9 32. (new) A computer program product comprising a computer usable medium having computer
10 readable program code means embodied therein for causing functions of digital television, the
11 computer readable program code means in said computer program product comprising computer
12 readable program code means for causing a computer to effect the functions of claim 27.

13 33. (new) An article of manufacture comprising a computer usable medium having computer
14 readable program code means embodied therein for causing wartermark signal generation, the
15 computer readable program code means in said article of manufacture comprising computer
16 readable program code means for causing a computer to effect the steps of claim 6.